

ABSTRACT

A scanning system includes a hand-held scanning device that generates two-dimensional images of a pattern reflected off an object. The system also includes a memory and processing unit. The memory stores a calibration table for the scanner and received scanned bitmap images.

5 The processing unit generates three-dimensional information as to a scanned object.

The scanning can be performed without knowledge or even precise control of the position of the object relative to the scanner. Random movement of the object during scanning is also possible. For example, the scanner is simply swept over the surface of the object by hand. Three-dimensional information of the object is obtained from the captured images using a calibration table for the scanner. A method of calibration of the scanner in X, Y and Z directions is also described. The scanner can be used for a variety of purposes, including medical and industrial purposes. The illustrated embodiment is *in-vivo* scanning of human teeth for purposes of orthodontic treatment planning and diagnosis.

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